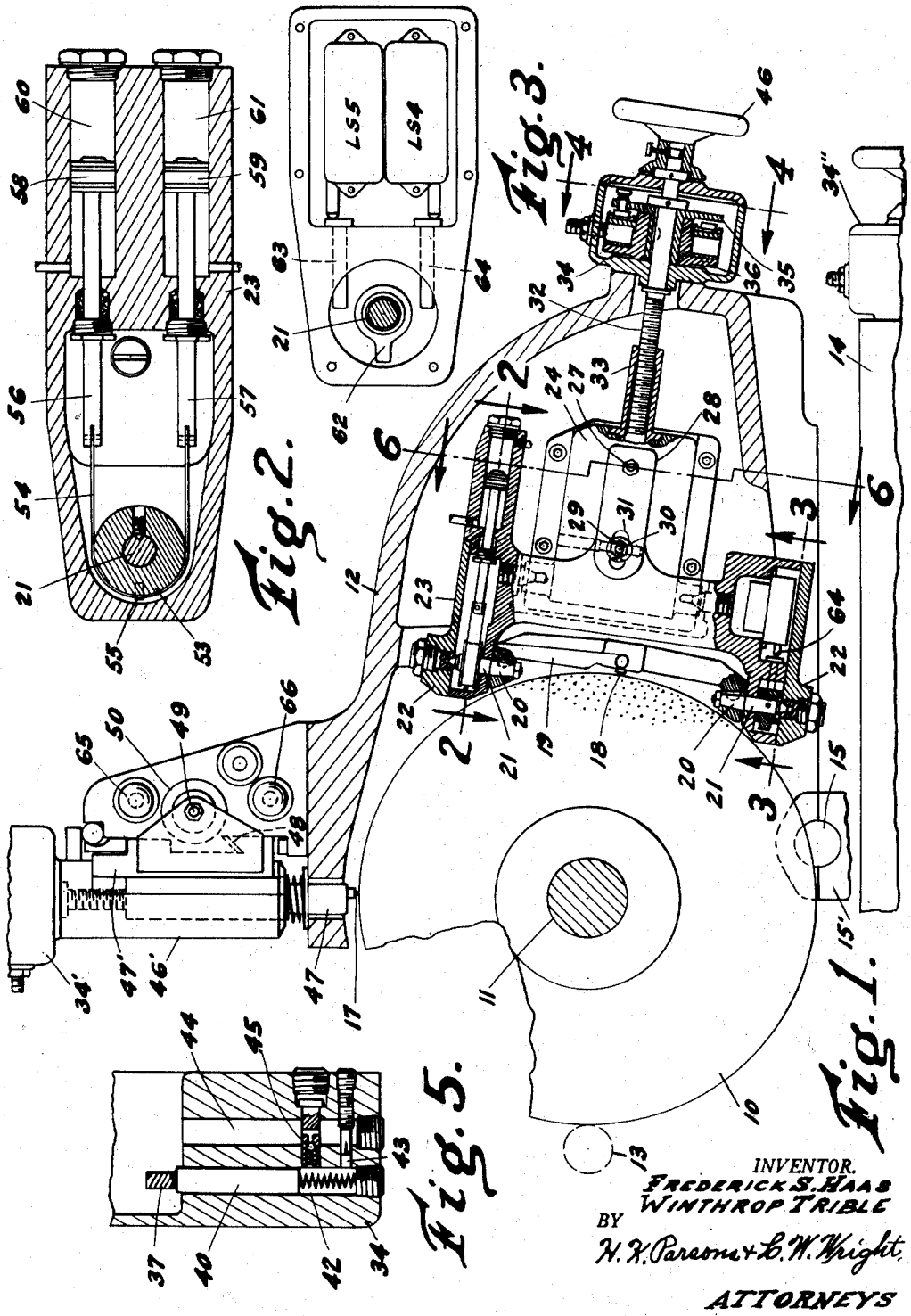
Jan. 12, 1954 F. S. HAAS ET AL 2,665,681

TRUING MECHANISM

Filed Feb. 10, 1951

3 Sheets-Sheet 1



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TRUING MECHANISM

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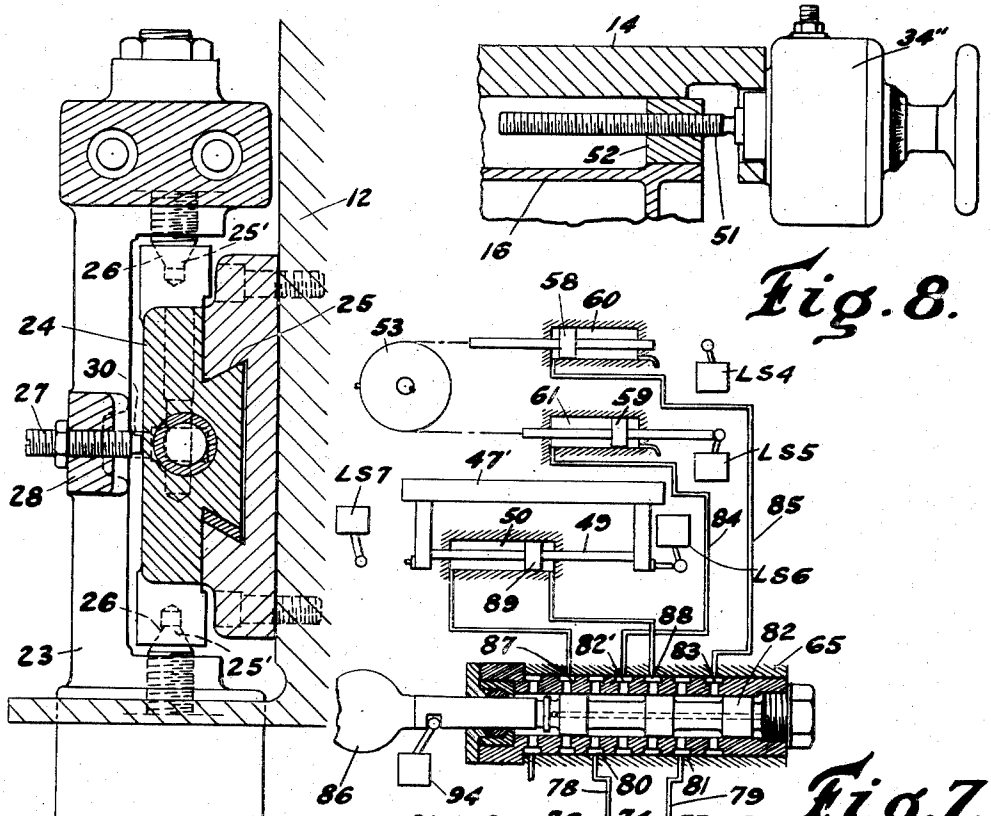


Fig. 8.

Fig. 7.

Fig. 6.

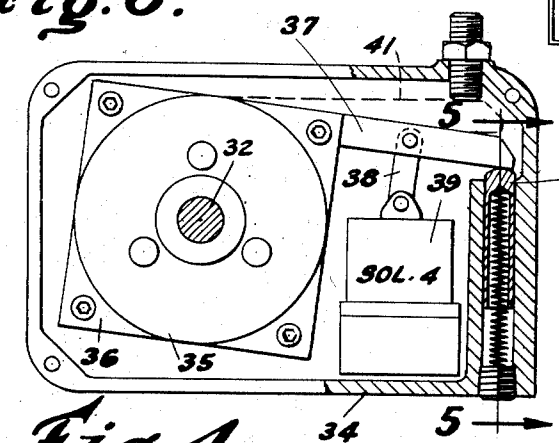


Fig. 4.

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3 Sheets-Sheet 3

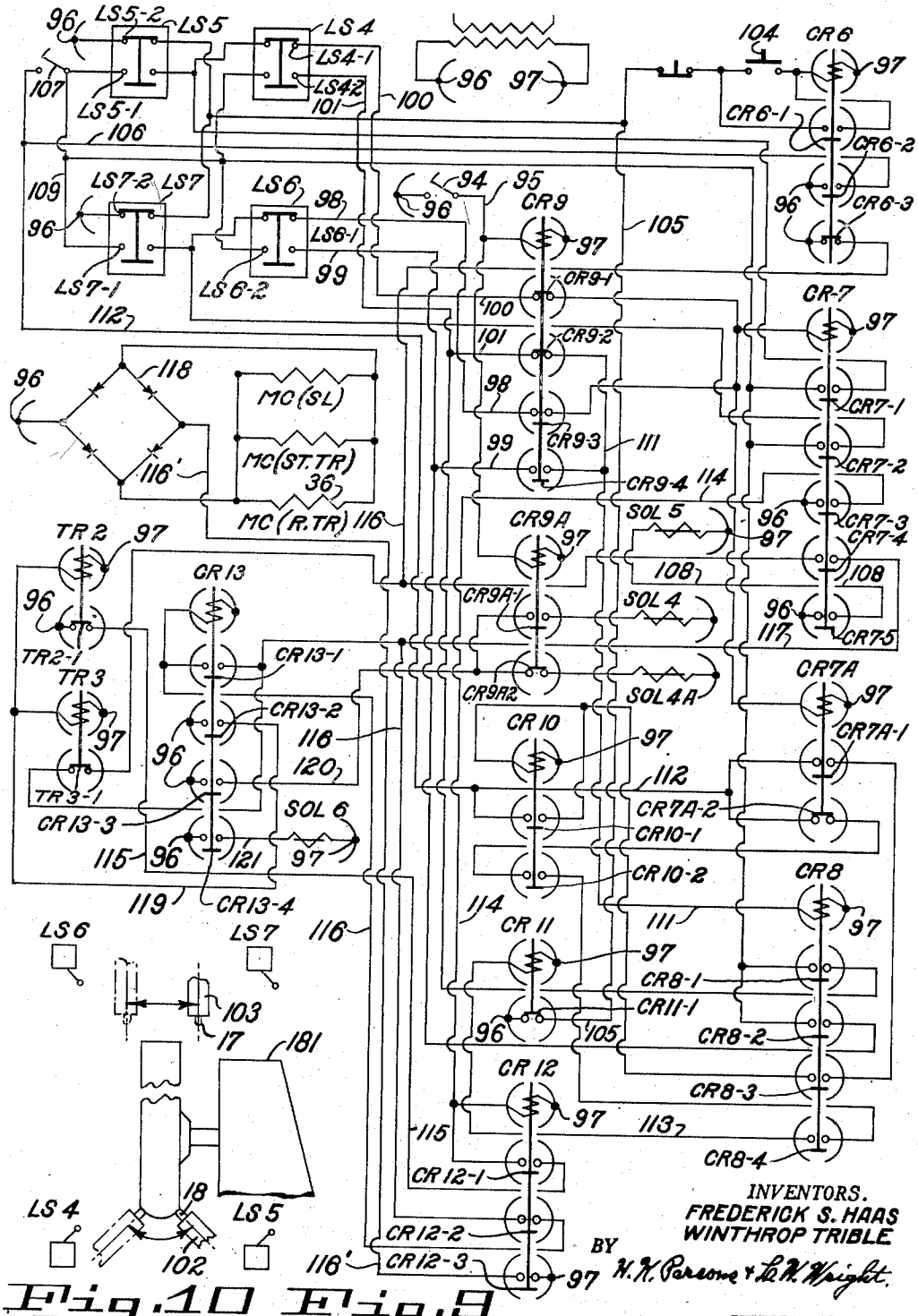


Fig. 10 Fig. 9

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UNITED STATES PATENT OFFICE

2,665,681

TRUING MECHANISM

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Application February 10, 1951, Serial No. 210,302

5 Claims. (Cl. 125—11)

1

This invention relates to grinding machines and more particularly to improvements in mechanism for truing the grinding wheels thereof. In order to grind surfaces of different shapes in a grinding machine, it is necessary to utilize a grinding wheel having a profile corresponding to the desired shape. In such cases, it is economical to provide a grinding wheel for each shape to be ground, and sometimes even separate machines are provided so that a type of truing mechanism suitable for producing the shape may be permanently mounted on the machine. Otherwise, if different shapes are to be ground on the same machine, it is necessary to change both the wheel and the truing mechanism which means longer set-up time to get them both in the same relation that they had previously. By means of this invention two truing mechanisms are permanently mounted on one machine in such relation as not to interefere with one another but on the other hand so that they will cooperate with their respective wheels when mounted in the usual manner on the wheel supporting spindle.

It is thus an object of this invention, to provide in a grinding machine, two different types of truing mechanism in operative relation to a common grinding wheel spindle for selective utilization of either truing mechanism dependent upon the wheel in situ.

Another object of this invention is to provide a common control mechanism for more than one truing mechanism which will control the power operation of either mechanism and effect automatically the necessary adjustments of the various supports to compensate for each reduction in wheel size effected by a truing cycle regardless of which mechanism is being utilized.

It is a further object of this invention to provide a grinding machine with truing mechanisms, so that wheels of different profiles may be readily interchanged on the machine spindle but still each will be in proper working relation to its respective truing mechanism.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification, considered in conjunction with the accompanying drawings forming a part thereof, and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

Referring to the drawings in which like numerals indicate like or similar parts:

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Figure 1 is a side elevation partly in section showing the mounting and relationship of two truing devices with respect to the grinding wheel spindle.

Figure 2 is an enlarged section on the line 2—2 of Figure 1.

Figure 3 is an enlarged section on the line 3—3 of Figure 1, looking up from the bottom.

Figure 4 is an enlarged section on the line 4—4 of Figure 1.

Figure 5 is a detail section on the line 5—5 of Figure 4.

Figure 6 is a vertical section on the line 6—6 of Figure 1.

Figure 7 is a diagram of the hydraulic control circuit.

Figure 8 is a detail view of the work slide feeding mechanism.

Figure 9 is a diagram of the electrical control circuit.

Figure 10 is a digrammatic view showing the cyclic movements of the truing diamonds and the trip control limit switches.

The adaptation of this invention has been illustrated in connection with a grinding machine of the type shown in United States Letters Patent 2,478,562. In Figure 1 of the drawings, the reference numeral 10 indicates a grinding wheel of such a machine mounted on a grinding wheel supporting spindle 11 which is suitably journaled in the oscillatable head 12 for movement of the grinding wheel into and out of contact with a work piece which has been indicated by the circle 13. It is to be understood that the work piece is suitably supported for rotation on a work supporting slide as shown in said patent, and for the purposes of this disclosure a portion only of the slide is shown in Figures 1 and 8 and indicated by the reference numeral 14. It is to be understood that the oscillatable head 12 swings about a pivot 15, and this pivot is mounted on a fixed part 15' of the bed of the machine. Similarly, the slide 14, as shown in Figure 8, is slidably supported on a fixed part 16 of the machine bed. Thus, the slide 14 is capable of relative longitudinal movement with respect to the oscillatable head 12, and in so doing would move the work piece 13 toward and from the grinding wheel.

Since the grinding wheel is fixed with respect to the bed except for this oscillating movement it is obvious that each reduction in wheel size effected by a truing operation necessitates readjustment of the parts in that the work support must be advanced toward the grinding wheel by an amount necessary to compensate

for the truing operation. Another consequence of the wheel being practically flexed is that each time a truing diamond takes a cut off of the wheel, the diamond must be advanced a similar amount to compensate for the reduction in wheel size. These adjusting movements are practically equal, and means have been provided for effecting both compensations at the same time.

One of the truing diamonds is indicated in Figure 1 by the reference numeral 17, and a second truing diamond is indicated by the reference numeral 18. The diamond 17 is mounted or supported on the top of the housing 12 for traverse movement, and thus is capable of truing a straight surface on the periphery of a grinding wheel, while the diamond 18 is supported in circumferentially spaced relation from diamond 17 for swinging movement for truing curved or arcuate surfaces on the periphery of a wheel.

This arrangement makes it possible to mount a first grinding wheel on the spindle and true it with a straight face by means of diamond 17, or mount a second grinding wheel on the spindle and true it to a curved surface by the diamond 18. Either wheel may then be remounted on the spindle, and it will be in substantially the same position relative to its truing diamond as it had in the first instance.

Each diamond is arranged to execute a cycle that is one pass across the wheel and another pass back to the starting position. The starting position is also the rest position as when the diamond is not in use. In order that the diamonds do not interfere with wheel mounting or removal, they both have a rest position, as shown in Figure 10, on the side of the wheel next to the housing 181 for the spindle. Thus, the wheels may be pulled off the free end of the spindle without interference or damage to either diamond.

The mechanism for supporting the truing diamond 18 is shown in Figures 1 and 6. As shown in Figure 1, the diamond 18 is supported on a swinging arm 19 which is keyed to the tapered ends 20 of short shafts 21 which are journaled for rotation in the bifurcations 22 of the housing 23. The diamond is located eccentric to the axis of rotation of the shafts 21, and the radius may be adjusted, in fact, it may be adjusted to either side of the axis, depending upon whether it is desired to produce a concave or convex surface on the periphery of the wheel.

The housing 23 is, in turn, adjustably mounted on a slide 24. As shown in Figure 6, the slide 24 moves in a dovetailed guideway 25 formed in a fixed part of the housing 12. The housing 23 is pivotally mounted or supported for adjustment on a pair of tapered pivot pins 25' which are threaded in the housing 23 and engage tapered sockets 26 formed on opposite sides of the slide 24. An adjustable set screw 27 is threaded in the end of the arm 28 of the housing 23 whereby adjustment of the screw towards the slide 24 will cause the housing to swing about the pivots 25'. The extent of this movement is limited by a stop nut 29 threaded on the end of a screw 30 which is anchored in the slide 24 and passes through a slot 31 in the arm 28. Adjustment in the other direction is effected by backing off the screw 27 and tightening up on the nut 29. This adjustment permits centering of the axis of rotation of the shafts 21 relative to the center of the face of the grinding wheel. In some cases it is desirable that this axis pass through the center of the wheel where the contour on each half of the wheel is the same, whereas in other cases it may be desirable to move the axis off center.

The slide 24 makes it possible to adjust the diamond toward the wheel as the wheel wears away, and this is accomplished by a feed screw 32 which is threaded in a nut 33 forming part of the slide 24. The feed screw is journaled in a housing 34 attached to the rear end of the oscillatable wheel housing 12 and has keyed to it one member 35 of a magnetic clutch. The other member 36 is mounted for free rotation about the axis of the feed screw and is provided with an operating arm 37 as shown in Figure 4. When the magnetic clutch is electrically energized, rotation of the member 36 imparts rotation to the member 35 and thereby to the screw 32.

The arm 37 is connected by a link 38 to an electric solenoid 39. The arm 37 is sufficiently long to overlie the end of a spring pressed plunger 40.

The plunger 40 acts first as part of a dashpot to prevent hammering of the parts upon actuation of the solenoid and also serves as means to return the arm 37 to its original position indicated by the dotted lines 41 in Figure 4 for the next indexing stroke to effect incremental feeding movement of the diamond. In other words, the clutch is electrically energized to magnetically couple the parts 35 and 36 for joint rotation, and the solenoid is then energized to effect the rotation, the plunger acting as a dashpot during the rotation.

As shown in Figure 5, the plunger 40, in moving down through the cylinder 42, forces oil through a throttle valve 43 into a reservoir chamber 44, and, upon upward movement, the oil will return through a check valve 45 to the cylinder 42.

After the plunger has been moved down by the solenoid the clutch is demagnetized and then momentarily afterwards the solenoid is deenergized whereby the lever arm is returned by the spring pressed plunger for the next indexing movement. The operation is thus similar to a ratcheting movement.

A hand wheel 46 is attached directly to the end of the screw shaft 32 so that the the screw may be manually actuated at will by the operator.

Similar devices have been provided for feeding the diamond 17, and also for feeding the work supporting table 14. For instance, in Figure 1, a housing 34' contains a magnetically operable clutch for actuating the feed screw contained in the housing 46' for moving the plunger 47 which carries the diamond 17. The housing 46' is mounted on a cross slide 47' mounted in a dovetailed guideway 48 and connected by a piston rod 49 to an actuating cylinder 50. As shown in Figure 8, another housing 34'' contains a magnetic clutch for actuating the feed screw 51 which is carried by the work slide 14, and threaded in a fixed nut 52 carried by the bed of the machine, whereby rotation of the screw will adjust the work toward the wheel. Thus, all three devices may be incrementally fed by means of magnetically operated clutches and their actuating solenoids.

The diamond carrier 19 is oscillated by means of the mechanism shown in Figure 2. In this figure, the shaft 21 has a pulley 53 secured

thereto, and a flexible band 54 is wrapped around the pulley and connected thereto by a pin 55 to prevent slippage between the band and the pulley.

The opposite ends of the band are connected to separate piston rods 56 and 57, which, in turn, have pistons 58 and 59 connected to the ends thereof and slidable respectively in cylinders 60 and 61. The cylinders are formed in the housing 23.

The lower pivot shaft for the diamond carrier 19, as shown more particularly in Figure 3, is provided with a trip arm 62 which alternately engage plungers 63 and 64 for actuating control limit switches. Since the view of Figure 3 is taken looking up from the bottom of the device, it is desired to point out that the trip arm 62 will normally be in engagement with the plunger 63 when the device is at rest. A hydraulic control circuit has been provided for controlling operation of the various pistons and is shown in Figure 7. In this circuit there is a selector valve 65 and a reversing valve 66. The reversing valve is supplied with pressure fluid by a conventional pump 67 suitably located in the machine having an intake 68 for withdrawing oil from a reservoir 69 and pumping it through channel 70 to pressure port 71 of the reversing valve. The channel 70 may have a suitable relief valve 72 connected thereto. The reversing valve has a valve plunger 73 in which is formed a pair of annular grooves 74 and 75 for alternately connecting the pressure port 71 to motor ports 76 and 77.

These motor ports are connected by channels 78 and 79 to ports 80 and 81 respectively of the selector valve 65 which determines which hydraulic truing device will be operated. As shown in Figure 7, the valve plunger 82 of the selector valve is in a position to connect the ports 80 and 81 to ports 82' and 83 which are permanently connected to cylinders 61 and 60 by channels 84 and 85.

It will be noted that these channels 84 and 85 are connected to the same end of cylinders 60 and 61 with the result that when pressure is admitted to channel 84 the piston 59 will rotate the pulley 53 in a counterclockwise direction, and when pressure is admitted to channel 85 the pulley 53 will be rotated in a clockwise direction.

The valve plunger 82 of the selector valve may be shifted to the left by the operating knob 86, and the valve plunger will then connect ports 80 and 81 to ports 87 and 88 respectively whereby the motor channels 78 and 79 will then be connected to opposite ends of cylinder 50. This cylinder contains a piston 89 which is connected to the piston rod 49 for shifting the slide 47' carrying the truing diamond 17.

The reversing valve plunger 73 is automatically shifted to the left by an operating solenoid and the plunger is drilled to receive a spring 90 which engages the end of a plunger 91 that is held against movement by a cross pin 92 mounted in the valve housing so that when the plunger 73 is moved to the left it will compress the spring against the fixed plunger 91 whereby when the operating solenoid is deenergized the spring 90 will act to return the valve plunger to the position shown. The valve plunger 73 may also be moved at will by an operating knob 93 operatively connected to the end of the plunger.

It will thus be seen that the same hydraulic actuating circuit may be used for effecting either truing cycle, the operator making the selection by proper positioning of the selector valve 65.

An electrical control circuit, Figure 9, is provided in conjunction with the hydraulic circuit to provide the necessary control means whereby either cycle may be effected automatically. This circuit also provides means for automatically indexing the various parts to compensate for reduction in wheel size as the truing operation progresses.

In the operation of this machine the operator selects and mounts the desired wheel on the grinding wheel spindle and then selects the proper truing mechanism for the selected wheel by positioning the selector valve 65. The positioning of the selector valve plunger automatically positions a selector switch 94 which, as shown in Figure 7, is operatively connected to the selector valve plunger. The switch, which is shown in Figure 9, automatically conditions the electrical circuit for control of the proper truing mechanism, and interlocks the circuit in a manner to prevent operation of the other mechanism.

As shown in Figure 9, the switch 94 has an open position and a closed position. The open position corresponds to the position of the selector valve for effecting radius truing and corresponds to the position of parts in Figure 9. The effect of this is that the relays CR9 and CR9A which are connected in series with the switch 94 by the line 95 between the power line 96 and the power line 97 remain deenergized whereby the normally open contacts CR9–3 and CR9–4 in lines 98 and 99 respectively remain open, and the normally closed contacts CR9–1 and CR9–2 in lines 100 and 101 remain closed. The normally closed contacts serve to connect the limit switches LS4 and LS5 associated with the truing diamond 18, Figure 10, to the control relays CR7 and CR8, and the normally open contacts CR9–3 and CR9–4 serve to disconnect the limit switches LS6 and LS7 associated with the diamond 17, Figure 10, from the control relay CR7 and CR8. These contacts provide an interlocking arrangement whereby only one set of limit switches can be connected at a time to the control relays.

Attention is invited to the relation of the limit switches as shown in Figure 10. The position 102 of the diamond 18 constitutes the rest and starting position, and in this position the control dog 62, shown in Figure 3, rests against the limit switch LS5 and holds its contact LS5–1 in a closed position. Similarly, the position 103 of diamond 17 is its normal rest and starting position in which a control dog operatively connected with the slide 47' holds the limit switch LS7–1 in its closed position. It is also to be noted that under these conditions the reversing valve plunger 73 is in the position shown in Figure 7 with its solenoid 5 deenergized.

Considering now automatic cycle operation of the truing diamond 18, the operator energizes the circuit by pressing the start button 104 which closes the circuit through line 105 to the control relay CR6. This relay closes its latching contact CR6–1, thereby permitting release of the starting button by the operator. The relay CR6 also closes a second switch CR6–2 in line 106 leading to the truing starting switch 107. When the latter switch is closed, a circuit is completed to the line 100. Since limit switch LS5–1 is held closed by its operating dog as just explained, and the contact LS4–1 of limit switch LS4 is a normally closed contact, the circuit is complete

through line 100 to relay CR7 and relay CR7A. The relay CR7 closes its contact CR7–5 in line 108 and completes a circuit to solenoid 5 which shifts the reversing valve plunger 73 shown in Figure 7 and thereby connects the pump to cylinder 60. This moves the piston 58 to the right as shown in Figure 7, and through the operative connection by means of the band 54 the piston 59 is moved to the left. This releases the limit switch LS5–1 which opens, but the circuit has been latched in by the closing of contact CR7–1 by relay CR7.

When the diamond completes a pass in one direction, the limit switch LS4–1 is operated, opening its normal closed contact, thereby releasing the relay CR7, which opens contact CR7–5 to solenoid 5, causing shifting of the reversing valve.

The hydraulic circuit then functions to return the truing diamond and as it starts back it releases limit switch LS4–1 which assumes its normally closed position but since the latching contact CR7–1 is open, due to the release of relay CR7, a circuit is not reestablished until completion of the return movement when LS5 is again closed.

The cyclic operation of the other truing diamond is effected by similar mechanism after the operator has made the selection by closing switch 94. This causes actuation of control relay CR9 which opens contacts CR9–1 and CR9–2, and closes contacts CR9–3 and CR9–4. This connects the limit switches LS6 and LS7 to relay CR7 and disconnects limit switches LS4 and LS5. The limit switch LS7–1 is held closed by a trip element whereby the closing of switch 107 completes a circuit through LS7–1, normally closed LS6–1, and CR9–3 to relay CR7 which causes actuation of the reversing valve solenoid 5 through the closing of switch CR7–5 in line 108. As the truing diamond completes its pass it opens limit switch LS6–1, which thereby breaks the circuit to control relay CR7, opening its latch contact CR7–2 and opening the circuit to solenoid 5. The reversing valve returns to its original position and the hydraulic circuit retracts the truing diamond, closing limit switch LS6–1 but this does not affect the relay CR7 because of the opening of its latching contact CR7–2. The return movement continues until a trip element closes limit switch LS7–1, and the circuit is in condition to repeat the cycle.

The requirements of this machine are such that in truing the wheels it is satisfactory to make a roughing cut across a wheel over and back and then without further adjustment of the diamond, make another pass over and back to effect a finish truing operation. In view of this, the control cycle is designed for this method of operation; in other words, two cycles in succession without adjustment of the diamond.

Means are provided for automatically stopping the patricular mechanism after completion of the two cycles and before any more truing is done.

The indexing of the diamond may be effected automatically either at the end of a previous cycle or at the beginning of a new cycle before the actual traverse of the diamond. In this invention the indexing of the diamond and the compensation in the position of the work support is effected automatically at the end of the finish truing cycle so that the diamond is in proper position to take a roughing cut the next time that the circuit is operated. The indexing and compensation is initiated by the control relay CR8 which is closed during the first cycle by either limit switch LS4–2 through switch CR9–2 or by limit switch LS6–2 through switch CR9–4. Regardless of which switch energizes the relay CR8 it is latched in by its contact CR8–1 or CR8–2 so that a circuit is completed from line 106 through line 109, to line 111 and relay CR8, and this relay will remain closed for the remainder of the two cycles or until the switch CR6–2 is opened. Line 112 has serial switches CR7A–1 and CR8–3 leading to relay CR10. This line 112 is directly connected to line 106. It will be noted that the relay CR8 is energized midway of the first cycle of operation of either diamond by either limit switch LS4–2 or LS6–2, and in so doing the relay closes the latching contacts CR8–1 and CR8–2 whereby the relay remains energized after these switches are open on the return movement of the first cycle. Although the relay CR8 closes the contact CR8–3 in line 112 it did so at the same time that relay CR7A is deenergized so that the circuit to relay CR10 is not completed until the end of the first cycle of truing which results in the closing of switch CR7A–1, the relay CR7A being operated simultaneously with the relay CR7.

The result is that at the end of the first truing or roughing cycle the relay CR10 is energized and closes its latching contact CR10–1. The operation of relay CR8 alsol closes another of its contacts CR8–4 which is in line 113 leading to relay CR11. At the end of the first cycle, another contact CR10–2 in line 113 is closed by the relay CR10 but a third contact CR7A–2 in the line 113 is opened by relay CR7–A at the end of the first cycle so that the circuit is not completed to relay CR11 until the midpoint of the second cycle at which time CR7A–2 closes and thereby completes the cycle to relay CR11.

The function of relay CR11 is to automatically stop the cycle, and it has a normally closed contact CR11–1 in line 105, and it will be noted from the foregoing description that relay CR11 is energized at the midpoint in the second cycle at which time it will open its normally closed contact CR11–1. The circuit, however, to relay CR6 is maintained at this particular point by either the normally closed contact LS5–2 of limit switch LS5, or the normally closed contact LS7–2 of limit switch LS7. At the midpoint of the cycle the limit switches LS5 and LS7 are released and are not trip operated again until the end of the second cycle. Therefore, with CR11–1 held open at the midpoint of the second cycle it is obvious that at the end of the second cycle either LS5–2 or LS7–2 will be opened, which results in denergization of the control relay CR6.

The indexing and compensation is initiated by control relay CR12. This relay is actuated immediately upon the closing of switch 107, which initiates the start of a truing operation by energizing relay CR7. This relay immediately closes its contacts CR7–3 in line 114 which is directly connected to relay CR12. The relay closes its latching contact CR12–1 in line 115 and in series with normally closed contact TR2–1 of a timer relay. Thus, at the very start of the truing operation the relay CR12 is energized, and in so doing closes its contact CR12–3 in line 116', thereby energizing the rectifier 118 which, in turn, energizes all three of the magnetic clutches.

It should be remembered that this is merely energization of the clutches but does not cause any movement at the point. A relay CR13 actually controls the actuation of the solenoids

of the respective clutches, but the circuit is arranged in the following manner so that this relay is not operated until the truing operation is completed. In the line 116 leading to the relay CR13 there is a contact CR12-2 which is closed by the relay CR12 and the normally closed contact TR3-1 of a second timer relay TR3. Also, in this line is the normally closed contact CR6-3 of the starting control relay CR6, which is held energized throughout the truing operation, and therefore this contact is held open until the truing operation is automatically stopped, at which time this contact will close and energize relay CR13. This relay will close its latching contact CR13-1 which is shunted around the contact CR 2-2.

The contact CR7-4 in line 117, shunted around the contact TR3-1, is closed at the end of the truing operation and is held closed so long as relay CR7 is energized. The relay CR13 closes a contact CR13-2 in line 119 which leads to timer relays TR2 and TR3 connected in parallel to line 119. These timer relays are adjusted to effect a delayed closing, but the timing on relay TR2 is less than the timing on relay TR3. During this interval of time the relay CR13 has closed one contact CR13-3 in line 120 and another contact CR13-4 in line 21. The line 120 is connected in parallel to solenoids 4 and 4A by the selector switches CR9A-1 and CR9A-2. The contact CR9A-2 is a normally closed contact, while the other is normally open, and this condition corresponds to the open condition of selector switch 94, and when this switch is closed the condition is reversed in that CR9A-1 is closed and CR9A-2 is opened.

Therefore, the closing of contact CR13-3 selectively operates the magnetic clutch of the indexing mechanism of the truing diamond which has just been operated. At the same time the contact CR13-4 causes operation of the solenoid 6 and thereby effects a compensatory movement of the work support.

After these movements have been completed the timer relay TR2 operates to open contact TR2-1 in line 115, thereby deenergizing control relay CR12. The relay CR12 then opens its contact CR12-2 in line 116, but the circuit is maintained by the latching contact CR13-1 until the timer relay contact TR3-1 is opened by the later operation of timer relay TR3. By this arrangement the prior operation of relay CR12 opened contact CR12-3 in line 116', thereby deenergizing the magnetic clutches, and then the subsequent operation of relay CR13 denergizes the operating solenoids for the clutches, permitting return of the operating arms by the mechanical means previously described. It is desirable that there be a momentary delay to permit the residual magnetism in the clutches to leak away before the solenoids are deenergized and thereby insure against any retrograde movement when the operating arms are returned.

There has thus been provided an improved mechanism for selective truing of alternatively mountable grinding wheels of different profile on a grinding machine utilizing substantially the same hydraulic actuating mechanism and an accompanying control circuit which is selective to control the truing operation of either grinding wheel.

What is claimed is:

1. In a grinding machine having a support, a grinding wheel spindle housing mounted on said support, and a spindle journaled in said housing adapted to receive interchangeable grinding wheels of different profiles, the combination of separate mechanisms mounted on the housing for truing the respective wheels including separate power operable means connected to each mechanism, a common actuating and control mechanism for said power operable means including a common reversing mechanism therefor, electrically operable means connected to said reversing mechanism including a control relay, separate trip operable means operatively associated with each truing mechanism, and selector means for selectively coupling the power operable means of one truing mechanism to said reversing mechanism and simultaneously coupling the trip operable means associated with said one truing mechanism to said control relay.

2. In a grinding machine having a support, a spindle housing mounted on said support, a grinding wheel spindle journaled in said housing for interchangeably receiving grinding wheels of different profiles, the combination of separate truing mechanisms mounted on said housing for truing the respective profiles of the different wheels, separate power operable means connected to each of said mechanisms, a common actuating and control circuit for said power operable means including a reversing valve, means to selectively connect said power operable means to said valve, electrical shifting means in said circuit connected to said reversing valve, separate trip operable means operatively associated with each of said power operable means, separate electrical means for indexing each of said mechanisms toward the spindle, and selector means for simultaneously connecting the trip operable means and the indexing means of a particular truing mechanism to said control circuit.

3. In a truing mechanism for a grinding machine having a spindle for receiving interchangeable grinding wheels of different profiles, and a housing for supporting said spindle, the combination of means mounted on the housing for selectively truing said wheels including a first truing mechanism for producing one profile, a second truing mechanism for producing a second profile, separate fluid operable actuating means connected to the respective mechanisms, a source of fluid pressure, a reversing valve supplied by said source, a selector valve for connecting the fluid output from reversing valve to either of said fluid operable means in accordance with the profile of the wheel in situ, electrically operable shifting means connected to said reversing valve, separate trip operable control means operatively associated with the respective mechanisms, and means operable by said selector valve for operatively selectively connecting one trip control means to said electrical means for controlling the power shifting of said reversing valve.

4. In a truing mechanism for a grinding machine having a spindle for receiving interchangeable grinding wheels of different profiles and a housing for supporting said spindle, the combination of means mounted on the housing for selectively truing said wheels including a first truing mechanism for producing one profile, a second truing mechanism for producing a second profile, separate power operable means connected to the respective mechanisms, a source of power having a reversing means, a selector operable to couple the reversing means to either of said power operable means in accordance with the profile of the wheel in situ, power operable shifting means connected to said reversing means, separate trip control means mounted in operative relation to the

respective mechanisms, and individual connectors for the respective trip control means alternatively operable by the selector as it makes its selection of a particular truing mechanism to connect the trip control means associated therewith to said power operable shifting means.

5. In a grinding machine having a bed, a spindle housing mounted on the bed, and a grinding wheel spindle journaled in the housing and adapted to receive interchangeable grinding wheels, a work support guided on the bed for adjustment of work toward the grinding wheel spindle, the combination of separate truing mechanisms for the respective wheels mounted on the housing, each mechanism having a truing tool supported for adjustment radially of the wheel, separate power operable means connected to each tool for effecting adjustment thereof, additional power operable adjusting means connected to said work support, a truing cycle control mechanism for the machine including a control switch, each of said power operable means for

the tools having a circuit selectively connectable to said switch, additional circuit means coupling the work support adjusting means to said switch, and means operable by said switch for energizing the circuits connected thereto whereby one of said truing tools and the work support may be adjusted simultaneously toward the wheel.

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